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As discussed above, the system provides dynamic views of data without programming expertise. Users are thus moved closer to the data so that application development time is reduced. User interfaces may be created quickly and easily for information rich databases and for applications such as data warehousing and decision support. Further, limitations inherent in conventional forms-based or report-based applications are avoided.

Moreover, the techniques described here may be implemented in hardware or software, or a combination of the two. Preferably, the techniques are implemented in computer programs executing on programmable computers that each includes a processor, a storage medium readable by the processor (including volatile and nonvolatile memory and/or storage elements), and suitable input and output devices. Program code is applied to data entered using an input device to perform the functions described and to generate output information. The output information is applied to one or more output devices.

Each program is preferably implemented in a high level procedural or object-oriented programming language to communicate with a computer system. However, the programs can be implemented in assembly or machine language, if desired. In any case, the language may be a compiled or interpreted language.

Each such computer program is preferably stored on a storage medium or device (e.g., CD-ROM, hard disk or magnetic diskette) that is readable by a general or special purpose programmable computer for configuring and operating the computer when the storage medium or device is read by the computer to perform the procedures described. The system also may be implemented as a computer-readable storage medium, configured with a computer program, where the storage medium so configured causes a computer to operate in a specific and predefined manner.

Other embodiments are within the scope of the following claims.

What is claimed is:

1. A method for programming a programmable property of a computer-implemented object, comprising the steps of:

displaying for a user, an entry form for editing at least one programmable property of the computer-implemented object;

receiving a computer language independent functional expression generated using the entry form for the property of the object;

parsing the computer language independent functional expression;

generating a computer interpretable function from the expression; and

storing the function as a run-time value for the property of the object.

2. The method of claim 1, wherein the object has a byte code execution image, further comprising invalidating the byte code execution image, and generating a new byte code execution image.

3. The method of claim 1, further comprising determining whether a run-time display of the object is automatically updated, and if so, generating and executing the byte code.

4. The method of claim 1, further comprising cloning and storing the function as a design time value if the function is a constant.

5. The method of claim 1, further comprising displaying an error message if the expression is invalid.

6. The method of claim 1, wherein the step of parsing the computer language independent functional expression com-

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prises identifying one or more of the following: a function; an operator; a database column name; a variable; and a constant.

7. The method of claim 1, wherein the run-time value for the property of the object depends upon the identity of a viewer, further comprising generating a computer interpretable function that returns a viewer dependent run-time property value.

8. The method of claim 1, wherein the run-time value for the property of the object depends upon the location of a viewer, further comprising generating a computer interpretable function that returns a location dependent run-time property value.

9. A computer program product, stored on a machine readable medium, comprising instructions operable to cause a programmable processor to:

display for a user, an entry form for editing at least one programmable property of the computer-implemented object;

receive a computer language independent functional expression generated using the entry form for the property of the object;

parse the computer language independent functional expression;

generate a computer interpretable function from the expression; and

store the function as a run-time value for the property of the object.

10. The computer program product of claim 9, wherein the object has a byte code execution image, further comprising instructions operable to cause a programmable processor to invalidate the byte code execution image, and generate a new byte code execution image.

11. The computer program product of claim 9, further comprising instructions operable to cause a programmable processor to determine whether a run-time display of the object is automatically updated, and if so, to generate and execute the byte code.

12. The computer program product of claim 9, further comprising instructions operable to cause a programmable processor to clone and store the function as a design time value if the function is a constant.

13. The computer program product of claim 9, further comprising instructions operable to cause a programmable processor to display an error message if the expression is invalid.

14. The computer program product of claim 9, wherein the instruction to parse the computer language independent functional expression comprises instructions to identify one or more of the following: a function; an operator; a database column name; a variable; and a constant.

15. The computer program product of claim 9, wherein the run-time value for the property of the object depends upon the identity of a viewer, further comprising instructions operable to cause a programmable processor to generate a computer interpretable function that returns a viewer dependent run-time property value.

16. The computer program product of claim 9, wherein the run-time value for the property of the object depends upon the location of a viewer, further comprising instructions operable to cause a programmable processor to generate a computer interpretable function that returns a location dependent run-time property value.

17. A computer system, comprising a programmable processor configured to:

display for a user, an entry form for editing at least one programmable property of the computer-implemented object;